STATE OF ALASKA

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DIVISION OF WATER
Wastewater Discharge Permit Program

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RE: Draft §401 Certification of NPDES Permit No. AKG-31-5000 (formerly AKG-28-5000) Cook Inlet Oil and Gas Exploration, Development and Production Facilities located in State and Federal Waters

In accordance with Section 401 of the Clean Water Act and with Alaska Administrative Code 18 AAC 15, 18 AAC 70 (Water Quality Standards) and 18 AAC 72 (Wastewater Discharge), the Department of Environmental Conservation issues the enclosed draft Certificate of Reasonable Assurance for the renewal of NPDES General Permit AKG-2850000, regulating discharges from oil and gas exploration, development and production facilities at on-shore and off-shore locations in Cook Inlet, Alaska. The department reviewed the proposed wastewater discharges with respect to the standards and antidegradation requirements of the Alaska Water Quality Standards and makes a preliminary finding that any reduction in natural water quality of Cook Inlet to be in accord with the requirements of 18 AAC 70.015, Antidegradation Policy.

To prepare the draft 401 certification, the department reviewed the Mixing Zone Application for Cook Inlet Oil and Gas Operators (NPDES Permit No. AKG-28-5000 prepared for Unocal/Chevron, Conoco Phillips Alaska, Inc. and XTO Energy Inc., by Parametrix, dated August 5, 2004 and amended October 20, 2005, the NPDES permit applications, and the preliminary draft NPDES permit provided by EPA. . The draft 401 certification contains provisions that address the mixing zones described in the preliminary draft general permit and provisions directed toward compliance with other water quality standards.

Whereas the preliminary draft NPDES permit contains effluent limits in tables for permitted facilities that are based on variable discharge volumes of produced water (Discharges 015), the department's draft 401 certification proposes mixing zones based on the projected maximum volumes during the life-of-the permit (five years).. In previous discussions with EPA, the department has explained that we believe our "maximum volume" approach provides not only a "worst case" framework for calculating mixing zones and assessing risk to public health and environment but also a less confusing general permit. The draft 401 certification also includes mixing zones for sanitary discharges (Discharges 003) and other miscellaneous discharges (Discharges 005 -014).

The department reserves its comments related to other conditions proposed in the preliminary draft permit for a separate State response during the formal public comment period. While the department recognizes that EPA can include provisions not directly related to the water quality of the wastewater discharges in a permit, we reserve the State's ability to comment on these provisions.

Also, the department's draft 401 certification is provided to EPA so the agency can complete the draft permit to initiate the public notice and comment. The draft 401 certification is issued prior to the availability of the Environmental Assessment (EA) and Ocean Discharge Criteria Evaluation (ODCE) required for this permit. Therefore, the department withholds our review of certain permit conditions where the EA and OCDE documents influenced EPA's permitting decisions, especially those sections pertaining to environmental impacts and risks associated with the permitted discharges.

At this time, the Alaska Department of Natural Resources/Alaska Coastal Management Program is also reviewing the general permit renewal for consistency with the Alaska Coastal Management Program. Public comment on the ACMP review will run concurrently with the public review of the draft NPDES permit and draft 401certification.

If you have any questions regarding this draft 401certification please contact Sharmon Stambaugh at 907-269-7565 or Sharmon_Stambaugh@dec.state.ak.us.

Sincerely,

Gretchen Keiser

Gretchen Keiser
Program Manager
Wastewater Discharge Program

Enclosures: Draft Certificate of Reasonable Assurance for NPDES General Permits AKG-2850000

cc: via e-mail

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STATE OF ALASKA
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DRAFT CERTIFICATE OF REASONABLE ASSURANCE

A draft Certificate of Reasonable Assurance, as required by Section 401 of the Clean Water Act, was requested by EPA, Region 10, for NPDES General Permit No. AKG-31-5000, COOK INLET OIL AND GAS EXPLORATION, DEVELOPMENT AND PRODUCTION FACILITIES. This permit was formerly issued as AKG-28-5000. Water quality certification is required for the proposed activities because the activities will be authorized by an EPA permit identified as No. AKG-31-5000 and discharge(s) may result from the proposed activities.

Public Notice of the application for this certification was made in accordance with 18 AAC 15.140 through an EPA notice dated (XXXX) that includes information on DEC's intent to review and certify this permit.

Having reviewed the preliminary draft permit, the Alaska Department of Environmental Conservation certifies that there is reasonable assurance that the proposed activities, as well as any discharge that may result, are in compliance with the requirements of Section 401 of the Clean Water Act, which includes the Alaska Water Quality Standards (18 AAC 70), provided that the following stipulations are adhered to.

Mixing Zone Calculations

Discharge 003 (Sanitary Wastes)

Mixing zones for sanitary waste (for the parameters fecal coliform and Total Residual Chlorine) discharges are established in Table 1 below.

Table 1. Platform sanitary mixing zones

Facility	Treatment type	Length (m)	Width (m)
Platform Bruce	M91M Biological	60	0.5
Platform Dillon	M91M Biological	30	0.5
Platform Baker	M91M Biological	60	0.5
Granite Point Platform	M10 MSD	180	1.0
Steelhead platform	M10 MSD	260	1.5
Dolly Varden platform	M91M MSD	30	1
Tyonek A platform	M10M MSD	146	1

Rationale: EPA effluent guidelines (40 CFR 435) for oil exploration and production subdivide facilities into two categories: those with over 10 people continuously occupying the facility (M10) and those with up to 10 people and intermittent use (M91M). DEC's experience shows that most smaller Type II Marine Sanitation Devices (MSDs) that are standard technology for oil and gas platforms achieve only primary treatment standards

under normal operation. Some of the platform facilities have intermittent use, and some have wide ranges of discharge volumes depending on changes to on-site staffing.

The proposed permit specifies a mixing zone for domestic wastewater with radius 100m for both chlorine and fecal coliform bacteria. DEC reviewed this as a default mixing zone for all the Cook Inlet facilities sanitary discharges covered under this General Permit. While a default size would be convenient for a general permit, DEC's review showed that some platforms were able to achieve dilution in a smaller zone. Some platforms needed larger mixing zones for either fecal coliform or chlorine dilution. A length and width specification provides a better approximation of the behavior of the discharge plume than a circle. The narrow mixing zones proposed in Table 1 comply with State Regulations 18 AAC 70.240-270. The Department has authority to designate mixing zones in permits or certifications and specify that they are as small as practicable.

The applicable Alaska water quality standards for chlorine in marine water are 13 µg/l (acute) and 7.5 µg/l (chronic) for the aquatic life use (See 18 AAC 70.020(b) and DEC's Alaska Water Quality Manual for Toxic and Other Deleterious Organic and Inorganic Substances., May 2003.

The mixing zones for sanitary discharges are calculated for fecal coliform bacteria and total residual chlorine. Chlorine can cause acute effects to marine aquatic organisms. To be protected from acute effects, a drifting organism must not be exposed to pollutants at concentrations greater than the acute water quality standard for more than 15 minutes. The acute standard for marine water in the Alaska Water Quality Standards is 13 µg/l. The maximum expected Total Residual Chlorine (TRC) has been determined to be 13.35 mg/l. At this concentration the greatest period a drifting organism is exposed to pollutants at greater than acute levels at the 10^{th} percentile current is 4 minutes, and at levels greater than chronic effects at the 90^{th} percentile current is 2 minutes. Drifting organisms are therefore protected against acute and chronic effects at a TRC of 13.35 mg/l due to this limited exposure.

Fecal coliform bacteria pose a health threat, but this threat is based on the number of fecal coliform present, rather than a time of exposure. The greatest risk posed by fecal coliform in marine waters is to shellfish collected by humans for raw consumption, which could be impacted by fecal concentrations greater than 14fc/100 ml. The small size of the sanitary mixing zones will not result in such risk. Since these platforms are in open waters of Cook Inlet, none of these small mixing zones are expected to impinge on shorelines where shellfish collection would occur.

Discharges 005 – 014 (Miscellaneous Discharges)

Mixing zones for miscellaneous discharges are established in Table 2 below. These discharges represent the combined discharge of several types of waste streams typical of operations on oil and gas platforms such as boiler blowdown, non-contact cooling water, and waterflooding discharges.

Table 2. Miscellaneous discharges – acute and chronic mixing zones

	Acute		Chronic	
Facility	Length (m)	Width (m)	Length (m)	Width (m)
Anna	7	2	<1	<1
Dolly Varden	6	2	<1	<1
Granite Point	3	1	5	<1
Grayling	10	2.4	<1	<1
King Salmon	3	1	<1	<1
Monopod	8	2	<1	<1
Steelhead	485	40	<1	<1

Note: All discharges are surface discharges except for Steelhead platform which discharges below the surface. Subsurface discharge plume behavior is fundamentally different from surface discharge dispersion.

Rationale. For continuous discharges, both acute and chronic mixing zones are approved based on toxicity data submitted by the applicant. For intermittent discharges, the applicant proposed that only acute mixing zones would be required and DEC concurred. DEC evaluated mixing zones for these discharges based on risk to aquatic life as required in 18 AAC 70.240-270. Chronic effects were not considered a risk to aquatic organisms because of the short period of exposure. The longest period of time a drifting organism is exposed to toxic compounds higher than the acute criterion is 3.5 minutes according to analyses from the applicants' mixing zone submittal. Following review, DEC concurs that organisms are therefore protected against acute effects.

The proposed permit specifies a mixing zone for surface discharges with radius 100m. DEC reviewed this as a default mixing zone for all the Cook Inlet facility surface discharges such as flood waste water, cooling water, boiler blowdown, and desalination unit waste water covered under this General Permit. While a default size would be convenient for a general permit, DEC's review showed that some platforms were able to achieve dilution in a smaller zone. A length and width specification provides a better visualization of the behavior of the discharge plume than a circle. The narrow mixing zones proposed in Table 2 comply with State Regulations 18 AAC 70.240-270, giving the Department authority to designate mixing zones in permits or certifications and specifies that they be as small as practicable.

Since the CORMIX model was not designed to accommodate surface discharges, EPA and Parametrix , at the recommendation of the model developer, manipulated input data to approximate surface discharge by "mirroring" a discharge to the ocean bottom. While this was an expedient way to design mixing zones, it is an untested concept in Alaskan waters prior to this proposed permit. In addition, many of these discharges are intermittent and of short duration. DEC has some concerns about how representative sampling will be done for these discharges.

The Steelhead platform has a significantly larger mixing zone than the other platforms for these miscellaneous discharges. The Steelhead platform collects these waste streams and discharges them below the ocean surface. This facility uses CLW 1600, a surfactant to backwash sand filters which are used to condition silt-laden Cook Inlet water prior to deep underground injection for pressure maintenance (waterflood) of the oil reservoirs in order to enhance oil recovery. This chemical is essentially "soap" which has been winterized for use in cold weather climates. The winterization contributes additional toxicity to the product. However, the surfactant is generally only added to the backwash once every two weeks. This treatment process helps to break up "mud balls" and regenerate the filters for continued use. When discharged at the surface, surfactants tend to foam. Surface foam is prohibited in the current and proposed NPDES permits. Other platforms backwash their sandfilters, but discharge the backwash water at the surface. Other products are currently being investigated for use at the Steelhead platform for sandfilter backwashing.

Discharge 015 (Produced Water)

The Department authorizes mixing zones for produced water discharges from the existing facilities identified in Table 3 (attached at end of this certification). These mixing zones are for the Alaska Water Quality Standards: petroleum hydrocarbons [Total Aromatic Hydrocarbons (TAH) and Total Aqueous Hydrocarbons (TAqH)], Toxic and other Deleterious and Organic and Inorganic Substances (metals and ammonia), and Whole Effluent Toxicity (WET).

Rationale: In accordance with State Regulations 18 AAC 70.240-270, the Department has authority to designate mixing zones in permits or certifications. These mixing zones will ensure that the water quality standards are met at all points outside the zones. In the previous permit issued in 1998, the mixing zones were defined as cylinders because of the lack of site-specific water current direction information at the discharging facilities and because EPA'S PLUMES modeling software was used. The mixing zones in this draft 401 certification are based on the CORMIX model using site-specific current, temperature, and salinity data to more accurately reflect the dispersion of pollutants into Cook Inlet from these facilities than was modeled for the 1998 permit. The resulting mixing zones are long and narrow, reflecting the strong currents of Cook Inlet.

The chronic mixing zones for metals are based on either the aquatic life or human health criteria, whichever requires the greatest dilution. Permit effluent limits will be based on the dilutions associated with these mixing zones.

For the 1998 permit, minimal monitoring data was available for either modeling or permit limits. Mixing zone sizes were determined from known effluent maximum values. For this draft permit and draft certification, monthly monitoring report data was available from the several years of discharge under the 1998 permit. Mixing zone sizes for this permit renewal were determined using Reasonable Potential maximum effluent values, which is a conservative, statistically-based approach.

The largest mixing zones are associated with TAH/TAqH. The applicable water quality standards for hydrocarbons in the receiving water are no more than 10 µg/l for Total

Aromatic Hydrocarbons, and no more than 15 µg/l for Total Aqueous Hydrocarbons. These parameters are defined in the State Water Quality Standards, 18 AAC 70.020 (b) and are based on chronic toxicity testing. These mixing zones are necessary to bring the produced water discharge into compliance with State Water Quality Standards, 18 AAC 70.020(b) (Growth and Propagation of Fish, Shellfish, Aquatic Life, and Wildlife)

The department has reviewed the Mixing Zone Application for Cook Inlet Oil and Gas Operators (NPDES Permit No. AKG-28-5000 prepared for Unocal/Chevron, Conoco Phillips Alaska, Inc. and XTO Energy Inc., by Parametrix, dated August 5, 2004 and amended October 20, 2005. This document used data from the facilities and the CORMIX model for determining mixing zones and times of exposure for organisms in the discharge plume. This document constitutes the operators' applications and justification for the mixing zones. The Department used information in this document and the NPDES permit application to run CORMIX models to confirm the results. The Department concurs with the conclusions presented in that document, specifically those concerning mixing zone modeling, fate of chemical constituents, the aquatic life risk analysis, and the human health risk analysis.

Under the mixing zone regulation 18 AAC 70.240(a)(2), the mixing zone must be as small as practicable. 18 AAC 70.240(a)(3) also states that an effluent or substance will be treated to remove, reduce, and disperse pollutants, using methods found by the department to be the most effective and technologically and economically feasible, consistent with the highest statutory and regulatory treatment requirements. In discussions with EPA and Chevron/Unocal, it was determined that the Trading Bay Production Facility (TBPF) discharge would benefit from additional dispersion. This facility treats produced water from several platforms. According to the EPA Fact Sheet for this draft permit, the TBPF discharge volume represents 95.4% of the total amount of produced water entering Cook Inlet from the existing facilities. This is also a shore-based facility, not a platform discharge. The existing outfall line and diffuser was modeled with CORMIX, and EPA determined that modifications to the diffuser design would improve mixing and reduce the size of the mixing zone.

The agencies agreed that the potential for impact to the near-shore aquatic resources of Cook Inlet from existing facility discharge was greatest at the Trading Bay location. DEC concurs that the permit renewal should include a modification of the Trading Bay outfall diffuser to improve instantaneous mixing and reduce the size of the mixing zone. Although the actual amount of hydrocarbon entering Cook Inlet will not be changed, the impacted area of discharge and dispersal is smaller. In addition to technology requirements for treatment and discharges, and the requirement that a mixing zone be "as small as practicable", ADEC considered whether there was any risk to aquatic organisms. Under 18 AAC 70.250(a)(1), the department will not authorize a mixing zone if the department finds that available evidence reasonably demonstrates that the pollutants discharged could bioaccumulate, bioconcentrate, or persist above natural levels in sediments, water, or biota to significantly adverse levels, based on consideration of bioaccumulation and bioconcentration factors, toxicity, and exposure. The operators' application referenced above included a risk analysis of these discharges to aquatic organisms. The Department reviewed this risk analysis and conducted additional CORMIX model runs to confirm the exposure durations. DEC

concluded that the greatest risk to drifting aquatic organisms occurs within the acute zone. The time of exposure is always less than 15 minutes at the 90th percentile current, the current at which critical conditions were determined in the mixing zone application. Therefore there are no concerns of acute toxicity.

Chronic exposure times for WET, ammonia, metals and hydrocarbons were also determined and compared against the time period for chronic exposure testing, which is either 48 or 96-hours. The effects of hydrocarbons may take weeks, rather than days, so a conservative approach is to consider that the effects act within a period of 96 hours.

For all but Trading Bay Production Facility, the longest chronic mixing zones occurred at the 90th percentile current for TAH.TAqH. Platform Baker had the longest mixing zone, and the time of exposure within the plume does not exceed 22 minutes. At Trading Bay the largest mixing zone occurs at the 10th percentile current, and the time of exposure is less than 4 hours. For this discharge the time of exposure was determined by taking increments in the ambient current every 1.2 hours (1/10th the tidal cycle). The results are as follows:

Table 4. Exposure Calculations

Time (hrs)	Current (m/s)	Distance (m)	Incremental DF	DF	CL Conc (ug/l)	Flux Av multiplier	Flux av conc.
0		0	0	0	19700	1	19700
1.2	0.2	864	610	610	32	1.7	19
2.4	0.38	2506	1.35	824	24	1.9	13
3.6	0.5	4666	1.64	1351	15	2	7
4.8	0.64	7430	1.47	1985	10	2	5

Source: DEC CORMIX model runs

CORMIX generally shows modeled dilutions in the farfield as centerline dilutions. The mixing zone application is based on these centerline dilutions, which are lower than bulk or flux average dilutions. In the farfield, EPA uses the "flux average" concentration, not the centerline concentration. The flux average concentration varies from 100% of the centerline concentration at the transition from the near field to 50% of the centerline concentration when the chronic water quality standard is met. From the above table it can be seen that for Trading Bay (with a diffuser), a drifting organism will therefore not be exposed for more than 3.5 hours to concentrations greater than the TAH water quality standard. Should an organism remain at the very centerline for the whole distance (which is not likely), then the total time of exposure is 4.8 hours. Since the criterion is based on an exposure of greater than 48 hours, there is no risk posed the organism. Furthermore, should an organism be within the plume for a complete tidal reversal, then the greatest length of time the organism might remain in the plume is less than 8 hours (assuming it drifts within the width of the plume and is not always at the centerline).

DEC reviewed these proposed mixing zones under the anti-backsliding provisions of the Clean Water Act [CWA Section 402(o)] as these larger mixing zones, than in the current permit, may result in less stringent end-of-pipe effluent limits based on water quality . CWA Section 402(o)(2) outlines exemptions against the prohibition to the establishment of less stringent permit limits in a permit. 40 CFR 122.44(l)(1) also addresses anti-backsliding. Because the previous permit modeling was based on a different modeling software package (PLUMES) with comparatively little data to support the modeling, and given that there is extensive new data from the current permit's monitoring results, DEC does not believe that direct comparison of these effluent limits in the draft permit to those of the previous 1998 permit is applicable under the anti-backsliding provisions. Due to the increased ratio of produced water to hydrocarbons extracted from the Cook Inlet oil fields, which is a natural occurrence, a higher discharge volume and increased loading of pollutants have resulted for some facilities. However, some facilities have ceased operation.

In the 1998 permit, mixing zones were based on maximum recorded effluent values whereas in the 2005 draft permit, Reasonable Potentials (RP) determinations were used to derive these mixing zones. Very limited data was available for the 1998 mixing zone determinations.

Permit limits in both the 1998 and 2005 permits were calculated from RP calculations. The changes in these values are shown in Table 5 below. Some of the RPs vary greatly from the 1998 permit to the present draft permit. Again, one reason for this disparity is the limited amount of data available for the 1998 permit, which led to a higher multiplier (which incorporates a coefficient of variation and other statistical factors) used in the RP calculation. The comparison in Table 5 has limitations, but it is included to help understand changes in effluent value numbers in the 1998 and 2005 permits, especially when compared to changes in the mixing zone sizes. Permit limits for the renewal permit will be based on the RP analysis. Because of the increase in data collected during the last permit cycle, which has enabled a downward adjustment of the RP multiplier, it can be seen that some effluent loadings are considerably reduced.

A more direct anti-backsliding determination should be feasible by the next permit issuance when detailed data can be reviewed for two permit cycles with regularly reported data and the same mixing zone model. Similarly, a comparison between present RP's and those for the next permit in approximately five years will be more meaningful for pollutant discharge trends.

Table. 5. Comparison of 1998 and 2005 TAH/TAqH effluent reasonable maximum concentrations

Facility	1998 TAH/TAqH permit limits based on RP analysis	2005 TAH/TAqH calculated reasonable maximum levels based on RP analysis	Percent change
Granite Point Tank Farm	63,700 (TAH)	20,208 (TAH)	-68%
Trading Bay Production Facility	24,500 (TAH)	19,704 (TAH)	-20%
East Foreland Treatment Facility	92,700 (TAH)	25,560 (TAH)	-72%
Tyonek A (gas / TAqH)	4,530 (TAqH)	2,633.8 (TAqH)	-42%
Platform Bruce	298,000 (TAH)	91,700 (TAH)	-69%
Platform Anna	129,000 (TAH)	125,090 (TAH)	-3%
Platform Baker *	298,000 (TAH)	156,684 (TAH)	-47%
Platform Dillon *	88,900 (TAH)	33,864 (TAH)	-62%

Source: DEC CORMIX model runs
Notes:

1. For Granite Point the 1998 mixing zone was based on a TAH of 63,700 ug/l. The mixing zone for the present application is based on a TAqH of 116,345 ug/l.

2. Dilution factors are based upon Hazard Quotients, these are used as equivalents to the dilution factor for TAH or TAqH. However, where there is a large difference between the effluent maximums for TAH and TAqH, the HQ will lie somewhere in-between the dilution required for either parameter.

3. Platforms Baker and Dillon are currently inactive.

Other Provisions

New construction or modifications for diffusers or any other appurtenances for domestic or non-domestic wastewater treatment, conveyance and/or disposal is subject to plan review by the department.

Rationale: *For domestic wastewater, under18 AAC 72.200, a person must submit a plan to the department and obtain approval of that plan before constructing, installing, or modifying any part of a domestic wastewater collection, treatment, or disposal system. To obtain approval, a person shall provide to the department the information required by 18 AAC 72.205.*

Under 18 AAC 72.600, a person who constructs, alters, installs, modifies, or operates any part of a non-domestic wastewater treatment works or disposal system must first have written department approval of engineering plans submitted under this section.

Table 3. Mixing Zone Sizes for Produced Water Discharge 015

		CHEVRON								XTO Energy		ConocoPhillips							
Receptor/ Parameter	**Exposure Type**	**TBPF**		**GPTF**		**Anna**		**Bruce**		**EFTF**		**Tyonek A**		**Baker**		**Dillon**		**GPP**	
AQUATIC LIFE		**Length (m)**	**Width (m)**	**Length (m)**	**Width (m)**	**Length (m)**	**Width (m)**	**Length (m)**	**Width (m)**	**Length (m)**	**Width (m)**	**Length (m)**	**Width (m)**	**Length (m)**	**Width (m)**	**Length (m)**	**Width (m)**	**Length (m)**	**Width (m)**
Hydrocarbons (TAH/TAqH)	Chronic	2418	360	2685	20	2734	4	1840	11	1794	8	36	1	3016	6.6	2121	6.6	1863	22
Metals	Chronic	9	80	21	1	262	3	218	28	121	1	60	1	216	1	13	<1	14	1
	Acute	<1	80	19	1	239	3	201	26	142	1	36	1	202	1	11	<1	12	1
Ammonia	Chronic	1	80	53	1	102	2	61	8	21	1	4	1	197	1	--	--	35	1
	Acute	<1	80	7	1	15	1	10	3	<1	1	3	1	28	1	--	--	5	1
WET	Chronic	31	80	780	5	274	3	715	4	1742	8	73	<1	248	1	210	1	533	5
HUMAN HEALTH																			
Metals	Chronic	16	80	35	1	32	1	44	1	172	1	N/A	N/A	93	1	10	1	23	1
Organics	Chronic	<1	80	3	1	1	1	4	1	N/A	N/A	N/A	N/A	<1	1	--	--	2	1